



FINAL STATEMENT OF BASIS
Prepared by
California Department of Toxic Substances Control



For
HITACHI GLOBAL STORAGE TECHNOLOGIES, INC.
San Jose, California
Updated March 16, 2009

Facility/Unit Type:	Treatment and Storage
Contaminants:	Chloroform
Media:	Groundwater and soil gas
Remedy:	2-Phase TM Extraction System
Final Decision:	Corrective action is complete at the Chloroform Release Area

1. INTRODUCTION

In November 2007, the California Environmental Protection Agency, Department of Toxic Substances Control (DTSC) prepared a Final Statement of Basis for the selection of 2-PhaseTM Extraction as the remedy for chloroform contamination in the Chloroform Release Area. DTSC is now updating the Final Statement of Basis to include information regarding implementation of the remedy and the rationale for DTSC's proposed decision that corrective action is complete for the Chloroform Release Area. The Chloroform Release Area is an approximately 0.8-acre area in the vicinity of the former Building 028J on the 143-acre Redevelopment Property.

In September 2006, DTSC prepared a Statement of Basis to discuss the proposed remedy for the Hitachi Global Storage Technologies, Inc. (Hitachi GST) Redevelopment Property. The proposed remedy was to remove all contaminated soil at the Redevelopment Property above DTSC established cleanup levels. If excavation of contaminated soil was not feasible and the contaminants were volatile organic compounds (VOCs), other remedial actions for the Redevelopment Property, such as soil vapor extraction (SVE), would be considered. The proposed remedy did not address potential groundwater contamination on the Redevelopment Property. In November 2007, DTSC determined that corrective action was complete for the Redevelopment Property, except for the Chloroform Release Area, and modified the Hazardous Waste Facility Permit for the Hitachi GST facility to remove the entire 143-acre Redevelopment Property from the permitted facility boundary. The modified permit also incorporated the Corrective Action Consent Agreement issued by DTSC to Hitachi GST on November 20, 2007, for cleanup of the Chloroform Release Area. IBM, the previous owner of the Redevelopment Property, is conducting on-going remediation of groundwater under the oversight of the Regional Water Quality Control Board – San Francisco Bay (RWQCB-SFB).

During a series of investigations of the Redevelopment Property beginning in November 2005, elevated concentrations of chloroform (a VOC) were identified in groundwater, soil, and soil gas in the vicinity of former Building 028J located in the southwest portion of the Redevelopment Property. Hitachi GST prepared the "Corrective Measures Study Report, Chloroform Release

Area, Former Building 028J”, dated August 29, 2007, (“Chloroform CMS Report”). The Chloroform CMS Report summarizes investigations in the vicinity of former Building 028J, develops corrective action objectives, evaluates remedial alternatives, and describes implementation of the proposed remedy. The overall Corrective Action Objective (CAO) for the Chloroform Release Area (former Building 028J area), as stated in Section 5.0 of the Chloroform CMS Report, is “... to prevent exposure of future occupants to elevated concentrations of chloroform in soil, soil gas and groundwater.”

The specific CAOs for the Chloroform Release Area as discussed in Section 5.0 of the Chloroform CMS Report are as follows:

- To the extent practicable, remediate chloroform-contaminated soil and soil gas in the vicinity of former Building 028J Area to levels at or below site-specific residential RBTCs developed as part of the Remedy Completion Report: and
- To the extent practicable, remediate chloroform-contaminated groundwater in the vicinity of former Building 028J Area to levels below the site-specific residential RBTCs developed as part of the Remedy Completion Report and below the RWQCB-SF Cleanup Standard for chloroform of 80 µg/L specified for the Site in Order No. R2-2002-0082 – Final Site Cleanup Requirements, as amended by Order No. R2-2007-0004.

The risk-based target concentrations (RBTCs) represent the concentration of a chemical that can remain in the environment (soil, soil gas, and groundwater) and still be protective of human health for future land use. The “Remedy Completion Report” discussed in the Chloroform CMS Report above is the Final Remedy Completion Report for the Redevelopment Property.

Hitachi GST operated the 2-PhaseTM Extraction system from July 2007 to August 2008, with a one month shutdown in November 2007. During approximately 8,000 hours of operation, the 2-PhaseTM Extraction system removed approximately 68 million cubic feet of soil vapor and 535,000 gallons of groundwater. Hitachi GST has submitted to DTSC the “Final Remedy Completion Report, Chloroform Release Area at Former Building 028J”, dated November 17, 2008, (“Remedy Completion Report”), and the “Groundwater and Soil Gas Sampling Results – December 2008 Report, Chloroform Release Area at Former Building 028J,” dated January 5, 2009, with Errata Sheet, dated February 25, 2009, (“December 2008 Report”). These results indicate that the site-specific RBTCs for chloroform in soil, soil-gas, and groundwater have been achieved as have the corrective action objectives. Therefore, DTSC has made a final Determination that corrective action is complete for the Chloroform Release Area.

This Final Statement of Basis summarizes information that can be found in greater detail in the Chloroform CMS Report, Remedy Completion Report, the December 2008 Report and other documents contained in the administrative record for the Hitachi GST facility. DTSC’s Response to Comments document also explains additional bases for its decision. DTSC encourages the public to review these documents in order to gain a more comprehensive understanding of the facility and corrective action activities that have been conducted there.

Document Organization

This Final Statement of Basis for the Chloroform Release Area is divided into 11 sections as follows:

1. INTRODUCTION
2. FACILITY DESCRIPTION
3. CONTAMINATION DETECTED AND CLEANUP GOALS
4. EXPOSURE PATHWAYS
5. SELECTED REMEDY
6. INNOVATIVE TECHNOLOGIES CONSIDERED
7. REMEDY IMPLEMENTATION AND SYSTEM SHUTDOWN
8. PROPOSED CORRECTIVE ACTION COMPLETE DETERMINATION
9. SPECIFIC CONSIDERATIONS IN DETERMINING CORRECTIVE ACTION IS COMPLETE
10. PUBLIC PARTICIPATION
11. NEXT STEPS

List of Acronyms

bgs	below ground surface
CAO	corrective action objective
CEQA	California Environmental Quality Act
CMS	Corrective Measures Study
DTSC	Department of Toxic Substances Control
GST	Global Storage Technologies
IBM	International Business Machines
kg	kilogram
L	liter
MCL	maximum contaminant level
µg	micrograms
mg	milligrams
RBTC	risk based target concentration
RCRA	Resource Conservation and Recovery Act
RWQCB-SFB	Regional Water Quality Control Board – San Francisco Bay
Site	321-acre property owned by Hitachi GST at 5600 Cottle Road, San Jose
SVE	soil vapor extraction
UCL	upper confidence limit
VOC	volatile organic compound

2. FACILITY DESCRIPTION

Facility Location and Description

Hitachi GST owns and operates a design, development, and manufacturing facility for computer storage products, such as hard disk drives and component heads and disks, located at 5600 Cottle Road, San Jose, California (“the Site”). The Site is located in a mixed industrial, commercial and

residential area near the intersections of Monterey Highway, Blossom Hill Road, and United States (US) Route 101, approximately seven miles southeast of downtown San Jose.

The Site is approximately 321 acres in size. Prior to 1955, the Site was agricultural land, primarily tree orchards, with associated residences. In 1955, International Business Machines (IBM) purchased the Site. The Storage Technology Division of IBM owned and operated the Site from 1955 through 2002. IBM designed, developed, and manufactured computer storage devices, including hard disk drives, read/write heads, and disk storage media at the Site. On or about January 1, 2003, Hitachi GST, a new company formed as a result of a strategic combination of IBM and Hitachi's storage technology businesses, bought the Site.

Approximately 30 buildings were present on the Site prior to commencement of redevelopment activities in August 2006. The buildings were used for a range of activities, including manufacturing, testing, assembly, research, development, wastewater treatment, reverse osmosis/deionized (RO/DI) water production, utilities, chemical storage, other storage, security, offices, and cafeteria. Exterior areas of the Site primarily consisted of landscaped areas, orchards, sidewalks, water fountains, asphalt parking lots, and paved private roads.

A portion of the Site has been rezoned and will be sold and redeveloped into a mixed residential, commercial, and recreational open space area. In addition, Hitachi GST will be transferring ownership of Endicott Boulevard/Tucson Way, which borders the Site to the north, to the City of San Jose. Collectively, the land selected for redevelopment and sale (approximately 143 acres) is referred to as "the Redevelopment Property." Hitachi GST plans to continue industrial operations on the remaining portion of the Site, termed "the Core Area". All manufacturing-related activities currently located on the Redevelopment Property have been moved to the Core Area under the redevelopment plan.

The Hitachi GST facility is a large quantity generator (LQG) of hazardous waste and also maintains a Resource, Conservation and Recovery Act (RCRA) Permit for on-site storage and treatment of hazardous waste. The RCRA Permit encompasses approximately 158 acres of the Site. DTSC removed the Redevelopment Property from the RCRA Permit in November 2007.

Environmental Conditions and Land Use

Environmental Conditions

The Site is located within the Santa Teresa Basin in the southern end of the Santa Clara Valley. To the north and east are the Yerba Buena Hills and to the south and west are the Santa Teresa Hills. Exploratory borings on the Site reveal alluvial deposits of clays and silts interbedded with sand and gravel layers (aquifers). The alluvium generally contains more than five silty-clay layers, which vary from a few feet to more than 30 feet in thickness separating more than six aquifers. Fill materials at the Site are of variable thickness and properties. Moderately compacted fill ranging from depths of one to 18 feet have been encountered on-site. Beginning at the ground surface (or underlying surficial fill), there is a layer of medium plasticity clay that extends to a depth of about 5 to 10 feet below ground surface. Underlying deposits down to the water table vary across the Site, but primarily consist of additional clays and silts.

The aquifers are referred to as A, B, C, D, E, F, and G aquifers, with the A aquifer being the most shallow. The general depths of these aquifers below ground surface are as follows: A occurs between 20 to 50 feet; B lies between 50 and 95 feet; C is between 90 and 125 feet; D is between

140 and 160 feet; E is between 170 and 205 feet; F is between 230 and 260 feet; and G is between 270 and 275 feet. In some locations, the individual aquifers merge. All of these aquifer zones are hydraulically interconnected to some degree.

Groundwater measurements indicate that depths to shallow groundwater are currently approximately 30 feet or deeper, however, historically the recorded groundwater has been as shallow as 17 feet. This groundwater lowering is attributed to groundwater extraction throughout the Basin. Groundwater flow directions in aquifer zones vary across the Site, particularly in the A-aquifer zone. Groundwater movement in the A-aquifer zone varies from south to northwest, but exhibits stagnant conditions in the southwestern portion of the Site. Groundwater flow directions in the deeper aquifer zones are more consistent and generally trend to the northwest.

In the early 1980s, chlorinated hydrocarbons were detected in soil beneath an on-site underground tank farm. Site-wide investigations showed that volatile organic compounds (VOCs) were present in groundwater beneath and downgradient of the Site. Subsequently, the Site has undergone extensive remedial action including the remediation of solvent-impacted soil and extraction and treatment of on-site and off-site groundwater. Under an order from the Regional Water Quality Control Board, San Francisco Bay Region (RWQCB-SFB) (Order No. R2-2002-0082 – Final Site Cleanup Requirements, as amended by Order No. R2-2007-0004), IBM is obligated to remediate the groundwater. The requirements also include the development of land use and environmental covenants to prevent human exposure to contaminated groundwater.

Land Use

The Site is located in a mixed industrial, commercial and residential area near the intersections of Monterey Highway, Blossom Hill Road, and United States (US) Route 101, approximately seven miles southeast of downtown San Jose. The vicinity includes the following:

- Cottle Road is located to the west, with a shopping center, other commercial buildings, a hospital/medical center, and a medium-high density residential area beyond.
- IBM Building 025 (formerly part of the Site), which is now owned by Lowe's, is located to the northwest. This parcel is the proposed location of a future Lowe's store.
- Parcel O-6 (formerly part of the Site) is located to the northeast; bordering the Core Area and Endicott Boulevard/Tucson Way. Hitachi GST transferred ownership of Parcel O-6, which is approximately 11 acres, to the City of San Jose in November 2005. The planned land use for this parcel is a future City of San Jose Police Substation.
- Southern Pacific Railroad and Caltrain right-of-way, the Blossom Hill Caltrain Station, and Monterey Highway are located to the north, with medium to medium-low density residential, a commercial shopping area, and US Route 101 beyond.
- Highway 85 and the Cottle Road Light Rail Station are located to the south, with a hospital/medical center, library, and single-family residential area beyond.

Hitachi GST has moved its R&D and administrative office operations to a different location in San Jose (3403 Yerba Buena Road). In turn, most of the R&D and administrative office buildings at the Site (Buildings 010, 012, 018, 026, 028, 028J, and 051) have been demolished. Two

buildings, Buildings 009 (office) and 011 (cafeteria), on the Redevelopment Property are considered historically significant and will remain intact.

Facility Investigations

Extensive soil, soil gas and groundwater investigations have been conducted on the Redevelopment Property. In regards to Site-wide groundwater on the Redevelopment Property, IBM will continue remediation under the oversight of the RWQCB-SF. All soil investigation/ remediation has been completed on the Redevelopment Property, and no further action is recommended. The remainder of this section focuses on chloroform in soil, soil gas and groundwater in the Building 028J Area that was identified during the soil investigations.

Building 028J Area

Elevated concentrations of chloroform were identified in groundwater, soil, and soil gas outside and southwest of the chlorinated hydrocarbon impacted area discussed above, which IBM is currently remediating under order of RWQCB-SF. This chloroform-impacted area was discovered in the vicinity of former Building 028J, an approximately 2,000-square foot chemical storage building constructed in 1971 and demolished in September 2006 during redevelopment activities. It is believed that the source of the chloroform was an underground spill containment tank formerly located east of Building 028J. This tank was removed in early 1982; however, remediation of the area was not performed at that time.

3. CONTAMINATION DETECTED AND CLEANUP GOALS

The following table summarizes the chloroform concentration results from subsurface investigations in the vicinity of the Building 028J conducted in 2005 through 2007 and lists the cleanup goals for chloroform in soil, soil gas, and groundwater.

Media	Impacted Area	Contaminant	Maximum Detected Concentrations 2005-2007	Cleanup Goals (Corrective Action Objectives)
Soil	50 by 100 feet	Chloroform	31 µg/kg	8.7 µg/kg (RBTC)*
Soil Gas	100 by 150 feet	Chloroform	28 µg/L	1.1, 1.9, and 8.9 µg/L at 5, 10, and 15 feet, respectively (RBTC)*
Groundwater	150 by 175 feet	Chloroform	920 µg/L	80 µg/L (drinking water MCL)* 380 µg/L (RBTC based on vapor migration)*

*Section 5 of the CMS calls for these levels to be achieved “to the extent practicable.” (See Introduction section of this Statement of Basis above.)

Site-specific risk-based target concentrations (RBTCs) were developed for the chemicals of concern in the Redevelopment Property. RBTCs represent the concentration of a chemical that can remain in the environment and still be protective of human health for future land use; therefore, the RBTCs represent the cleanup goals for the Redevelopment Property. The RBTC for

chloroform in soil under a future residential land use scenario is 8.7 micrograms per kilogram ($\mu\text{g}/\text{kg}$). The RBTCs for chloroform in soil gas under a future residential land use scenario are 1.1, 1.9, and 8.9 micrograms per liter ($\mu\text{g}/\text{L}$) at a depth of 5, 10, and 15 feet, respectively. The RBTC for chloroform in groundwater under a future residential land use scenario (vapor migration into a building) is 380 $\mu\text{g}/\text{L}$; however, the RWQCB-SFB Groundwater Cleanup Standard for chloroform is 80 $\mu\text{g}/\text{L}$ (RWQCB-SFB Order No. R2-2002-0082 – Final Site Cleanup Requirements, as amended by Order No. R2-2007-0004). Therefore, in the case of groundwater, the cleanup goal for the Chloroform Release Area includes the RWQCB-SFB Groundwater Cleanup Standard of 80 $\mu\text{g}/\text{L}$, to the extent practicable.

Subsurface investigations of the Building 028J Area conducted in 2005 through 2007 identified concentrations of chloroform in soil slightly above the RBTC with detections ranging from 5.0 to 31 $\mu\text{g}/\text{kg}$. In general, chloroform-impacted soil is limited to an area of approximately 50 by 100 feet and to depths below 15 feet. Soil gas with concentrations of chloroform exceeding RBTCs is limited to an area of approximately 100 by 150 feet with detected concentrations ranging from 0.094 to 28 $\mu\text{g}/\text{L}$ in the unsaturated soil zone. Chloroform-impacted groundwater is limited to an area of approximately 150 feet by 175 feet with detected concentrations ranging from 1.8 to 920 $\mu\text{g}/\text{L}$. Concentrations of chloroform exceeding the RWQCB-SF Cleanup Standard of 80 $\mu\text{g}/\text{L}$ are limited to the shallow A-aquifer, which is encountered at a depth of approximately 32 feet below ground surface in the Building 028J Area.

4. EXPOSURE PATHWAYS

The proposed land use for the Redevelopment Property is residential, commercial, and open space (or park) use. Based on this proposed future land use, populations that could potentially be exposed to chemicals remaining in environmental media include residents, commercial workers, and park visitors. Additional populations on the Redevelopment Property could include short-term construction/maintenance workers during redevelopment or other short-term maintenance activities. RBTCs were calculated for each of these populations for all chemicals detected in groundwater, soil gas and soil. The cleanup goals listed above represent the RBTCs for the most conservative future land use; residential.

As shallow groundwater from the A-aquifer is not used for consumption and chloroform-impacted soil is generally limited to depths below 15 feet, ingestion and dermal contact are unlikely to be significant pathways for exposure. Therefore, the primary exposure pathway for future populations is inhalation via vapor migration into a building.

5. SELECTED REMEDY

The selected remedy for treating chloroform-impacted soil, soil gas, and groundwater in the Building 028J Area is 2-PHASE™ Extraction. This technology is widely used and is relatively easy to implement. 2-PHASE™ Extraction involves applying a vacuum to the subsurface via conventional groundwater wells. The vacuum is applied by a motor-driven blower that induces air flow in the subsurface to remove VOCs from soil, soil gas, and groundwater. Based on the results of a pilot test, 2-PHASE™ Extraction will be effective in removing chloroform from the subsurface in the Building 028J Area.

During 2-PHASE™ Extraction, groundwater and vapors drawn into the well by the vacuum are removed from the well casing through a specifically-sized and positioned suction pipe or “stinger”.

The induced vacuum draws vapor into the tip of the stinger at a velocity sufficiently high to entrain water and convey a water/vapor spray up the stinger and to the surface. The vapor and water phases are separated at the surface prior to treatment. The extraction of entrained water maintains the wells in a dewatered state, creates an unsaturated zone, and through continual dewatering of the wells desiccates the soil adjacent to the wells. This desiccation creates new air flow pathways, and enhances VOC removal rates, especially as soil particles with sorbed VOCs become exposed.

The flexibility of 2-PHASE™ Extraction allows installation of a well field consisting dual-use wells that can be easily switched from extraction to monitoring and vice versa. To maximize treatment efficiency and minimize treatment time, a well field consisting of 15 wells was developed for the Building 028J Area capable of treating the entire impacted area, or alternatively pulsing discrete zones while monitoring periphery wells.

The 2-PHASE™ Extraction system consists of a Rietschle VLR-500 high vacuum blower package with a pump-down vapor/liquid separator. This unit is capable of producing vacuums of up to 25 inches of mercury, vapor flow rates of up to 300 cubic feet per minute (cfm), and groundwater extraction and transfer rates of up to 15 gallons per minute (gpm), although the anticipated groundwater extraction rate is likely only 1 to 2 gpm. The unit is skid-mounted and is installed near the extraction well field. The extraction unit is connected to a treatment system consisting of two 1,000-pound vapor-phase granular activated carbon (GAC) vessels installed in series to treat the extracted vapors. The supplied GAC consists of virgin coconut shell carbon. The extraction unit is equipped with a heat exchanger for humidity control to increase the efficiency of carbon adsorption. Extracted groundwater is contained in closed-top holding tanks for subsequent treatment, reuse, and/or disposal.

The November 2007 Statement of Basis described the process for system shutdown in the section titled, "Next Steps" as follows:

- The extraction system will be operated, to the extent practicable, until the cleanup goals are met. The primary performance criteria will be the concentrations of chloroform in extracted vapor and groundwater. If extracted concentrations of chloroform decrease significantly, the system may be shut down temporarily or permanently.
- Decisions on shutdown will be based on a review of the extracted chloroform concentrations and secondary performance criteria, which include vapor flow rates, applied vacuum, vacuum radius of influence, groundwater extraction rates, and water table drawdown. These criteria will be used to decide whether changes in operation, including temporal or zone pulsing of the system, may increase removal rates or improve the effectiveness of the cleanup. If changes are not likely to improve the cleanup, temporary system shutdown will be followed by interim monitoring of soil gas and groundwater.
- Interim monitoring will consist of monthly monitoring of groundwater collected from the monitoring/extraction wells and soil gas collected from temporary or semi-permanent soil gas probes placed at intermediate points between the monitoring/extraction wells. If chloroform concentrations meet the cleanup goals

for three consecutive months, DTSC will evaluate whether the extraction system will be permanently shut down and the equipment demobilized.

- Concentrations in groundwater and soil gas tend to increase or “rebound” to some extent several months after shut down of 2-Phase™ Extraction. Post-remedial monitoring will be implemented for an additional three months after equipment demobilization to assess rebound of chloroform concentrations. If after three months of post remedial monitoring, the risk assessment for this area shows risks are within acceptable ranges for residential land use, the cleanup will be determined to be complete. If rebound is unacceptable, the extraction system may be returned to operation. If the cleanup goals cannot be met by continued operation of the 2-Phase™ Extraction system, then an alternative remedial approach will be considered.

6. INNOVATIVE TECHNOLOGIES CONSIDERED

Numerous technologies were identified and subjected to a technical screening. The primary screening criteria consisted of the technology’s effectiveness with chloroform and its potential limitations given the Site conditions. Other factors considered in the analysis included cleanup time and cost.

In addition to the selected remedy, removal technologies considered included soil vapor extraction, groundwater extraction, and air sparging. Removal technologies consist of those intended to physically remove VOCs from the subsurface soil, soil gas, and/or groundwater. In general, removal technologies are not stand alone remediation alternatives, but require a means of treating VOCs following removal from the subsurface. Treatment is typically accomplished aboveground where the treatment processes are easier to monitor and control. Removal technologies are considered advantageous in this case because of their ability to potentially overcome the stagnant hydrogeologic conditions in the Building 028J Area.

Both Soil Vapor Extraction and 2-PHASE™ Extraction were retained as suitable alternatives for concurrent soil and groundwater remediation at the Building 028J Area. These technologies are widely used and are generally nonselective for removal of VOCs in the vadose zone. Furthermore, the high Henry’s Law constant of chloroform indicates that significant mass transfer will occur from the aqueous phase to the vapor phase during treatment. 2-PHASE™ Extraction was selected because it can further expedite treatment by removing contaminated groundwater from the A-aquifer in the Building 028J Area and increasing flow through soil pore spaces formerly occupied by groundwater.

Groundwater Extraction (also known as, “Pump & Treat”) and Air Sparging were rejected as remedial alternatives during technical screening. Groundwater Extraction was rejected because the low-flow conditions within the A-aquifer in the Building 028J Area would limit removal rates. Furthermore, an additional alternative would be necessary to address vadose-zone contamination. Air Sparging was rejected due to the potential for mobilizing chloroform in the subsurface thereby causing migration of chloroform to other areas of the Site.

Aboveground treatment technologies considered included chemical/ultraviolet treatment and thermal oxidation. Chemical/Ultraviolet (UV) Oxidation and Thermal Oxidation were rejected as remedial alternatives during technical screening. Chemical/UV Oxidation was rejected because of

its complexity of operation and the need for a separate vapor treatment alternative. Thermal Oxidation was rejected based on its marginal effectiveness with low influent vapor concentrations. Carbon Adsorption was retained as an alternative for aboveground treatment of chloroform-contaminated vapor and groundwater. This is a relatively low cost and reliable treatment technology for treatment of VOC-contaminated water and vapor.

In-situ treatment technologies considered included bioremediation by gaseous substrate injection, anaerobic bioremediation, chemical oxidation, and chemical reduction with zero valent iron (ZVI). In-situ Anaerobic Bioremediation and In-situ Bioremediation via Gaseous Substrate Injection were both rejected due to the problems caused by elevated chloroform concentrations in the subsurface. Above certain concentrations, chloroform becomes toxic to anaerobic and aerobic microorganisms. In the absence of toxicity from other solvents, chlorinated hydrocarbons, or heavy metals, and where chloroform concentrations are below approximately 100 µg/L, both aerobic and anaerobic bacteria can degrade chloroform; however, deviations from these ideal conditions lead to low removal efficiencies. In-situ Chemical Oxidation was rejected due to its limited effectiveness with chloroform and the potential need for high doses of oxidants. In-situ Chemical Reduction via Zero Valent Iron (ZVI) was rejected because of potentially slow reaction rates and the requirement of a separate remedial approach for chloroform-contamination in the vadose zone.

7. REMEDY IMPLEMENTATION AND SYSTEM SHUTDOWN

From July 25, 2007 to August 12, 2008, Hitachi GST's contractor ENVIRON operated a full-scale 2-PHASE™ Extraction system to remediate chloroform in the former Building 028J area. The startup, operation, monitoring, and shutdown of the 2-PHASE™ Extraction system was performed in general accordance with procedures described in the Chloroform CMS Report. A well field consisting of 15 wells was originally developed capable of treating the entire impacted area. An additional well (EW-16) was installed in April 2008 to maximize the rate of chloroform recovery over the summer season when water levels were lower. In May 2008, two additional wells (EW-17 and EW-18) were installed to target removal of chloroform from the A/B Aquitard below the A-Aquifer.

The system operated for almost 13 months, with a one month shutdown in November 2007. In November 2007, the 2-PHASE™ Extraction system was shut down to allow for collection of soil gas and groundwater samples and to evaluate remediation progress. There were also brief system shutdowns at the end of January 2008 and at the end of February 2008 associated with flooding due to heavy rains. During approximately 8,000 hours of operation, the 2-PHASE™ Extraction system flushed and treated approximately 68 million cubic feet of atmospheric air through the vadose zone soils (removing chloroform in a vapor form in the process) and extracted 535,000 gallons of groundwater. The average extraction rates observed since startup were approximately 169 cubic feet per minute for vapor and approximately 1.2 gallons per minute for groundwater.

Based on its review of the monthly system monitoring results throughout the Spring and Summer (2008), DTSC concluded that the rate of chloroform removal by the remedial system was approaching asymptotic levels (i.e. the removal rates had "leveled off") and so the system was shut down on August 12, 2008. The first round of post-remediation groundwater and soil gas sampling was conducted during the first two weeks after system shutdown. A second round of post-remediation groundwater and soil gas sampling was conducted in mid-October 2008, and a third round of post-remediation sampling was conducted in late December 2008. The results of the first

two rounds of post-remediation sampling are summarized in the Remedy Completion Report and the results of third round are summarized in the December 2008 Report.

All post-remediation groundwater results for chloroform in A-aquifer wells (not including EW-17 and EW-18, which target the A/B-aquitard) are below the RBTC for chloroform in groundwater of 380 micrograms per liter ($\mu\text{g/L}$). The highest A-aquifer chloroform concentration in December 2008 was 140 $\mu\text{g/L}$, which is less than one-half the RBTC. As of late December 2008, only three A-aquifer wells (EW-5, EW-10, and EW-16) remain above the MCL for drinking water of 80 $\mu\text{g/L}$. The average concentration of chloroform in wells sampled from the A-aquifer in the final round in December 2008 is 72 $\mu\text{g/L}$, which is below the MCL.

The chloroform detection of 560 $\mu\text{g/L}$ in the December 2008 sample from EW-17 represents residual chloroform in A/B-aquitard materials in the vicinity of the original source area and is not representative of the A-aquifer. The elevated chloroform concentration observed in EW-17 is consistent with the previous maximum detection of chloroform in a saturated A/B-aquitard soil sample collected from the well screen interval prior to well construction. Groundwater low flow characteristics noted in December 2008 Report and observed during sampling indicate that well EW-17 is constructed in low permeable clay material and consistent with interpretation that elevated chloroform detected at EW-17 is related to chloroform mass located in A/B-aquitard. The chloroform concentration in EW-17 is expected to be the result of diffusion driven chemical transport and reflective of the A/B Aquitard clay pore water in the vicinity of the well screen.

All concentrations of chloroform measured in soil gas at five (5), ten (10) and fifteen (15) feet below ground surface (bgs) in December 2008 are well below the soil gas RBTCs of 1.1, 1.9 and 8.9 $\mu\text{g/L}$, respectively. The highest chloroform concentration in shallower soil gas in December 2008 (0.95 $\mu\text{g/L}$ at 10 feet) is approximately 50 percent of the RBTC. There were no previously approved RBTCs for the lower depths; however, all detections at depths greater than 15 feet bgs are below the RBTC for chloroform at 15 feet.

In determining whether the remedial system should be shutdown permanently, DTSC applied the criteria for system shutdown described in Section 7.10 of the Chloroform CMS:

“In general, permanent system shutdown and post-remedial monitoring will be initiated once one, or all, of the following has occurred: soil gas and groundwater concentrations of VOCs meet CAOs, steady-state residual concentrations of VOCs have been determined not to pose a significant threat to future occupants, and/or mass removal rates during continuous and pulsed modes no longer justify continued operation of the extraction system.” (Emphasis added.)

The post-remediation conditions at the Chloroform Release Area meet all three of these shutdown criteria (only one of which must be met to support shutdown).

1. Corrective Action Objectives have been met:

- Soil gas concentrations of chloroform meet the numeric thresholds in the specific CAO, i.e., chloroform concentrations in soil gas have been reduced to be below site-specific residential RBTCs (See Table 10 of the Remedy Completion Report and Table 4 of the December 2008 Report); and
- Groundwater concentrations of chloroform in all groundwater wells in the A-aquifer are below the RBTC (See Table 10 of the Remedy Completion Report and

Table 5 of the December 2008 Report). The 80 µg/L MCL has been met to the extent practicable, as discussed in detail in Response to Comment 6, incorporated herein by reference.

2. Steady-state residual concentrations of chloroform in groundwater and soil gas do not pose a significant threat to future occupants, as demonstrated by the risk evaluations in the Remedy Completion Report (See Section 7.1 and Table 11 of the Remedy Completion Report).
3. Chloroform mass concentration in extracted soil gas reached an asymptotic level during continuous and pulsed modes so that continued operation of the extraction system is no longer justified (see Section 5.3 and Figure 15 of the Remedy Completion Report).

8. PROPOSED CORRECTIVE ACTION COMPLETE DETERMINATION

The principal reasons for DTSC's proposed determination that corrective action for the Chloroform Release Area is complete are as follows:

- The overall CAO has been met, as have the specific CAOs for soil, soil vapor and groundwater. The RBTCs have been met for all three media.
- The drinking-water-based specific CAO for groundwater to achieve 80 µg/L of chloroform in groundwater "to the extent practicable" has been met.
- Extraction system shutdown criteria have been met. Chloroform mass removal rates reached an asymptotic level during continuous and pulsed modes so that continued operation of the extraction system is no longer justified. Three rounds of post-remedial monitoring confirm that the levels of chloroform in soil gas and groundwater are not expected to rebound to levels approaching, let alone exceeding, RBTCs.
- There is no continuing source of chloroform that would result in any increase in chloroform concentrations over the long term. There is only a small residue of chloroform, which is primarily found in the A/B Aquitard and it will continue to reduce over time through natural flushing.
- It is not feasible to remove the small amount of chloroform that remains bound in the A/B Aquitard. Furthermore, it is not necessary to remove this residual mass of chloroform in the aquitard because it does not significantly affect the chloroform concentrations in either the A-aquifer or the B-aquifer.
- There is no remaining unacceptable risk to human health. Chloroform concentrations are below the RBTCs for potential vapor migration, and there is a land use covenant that prevents use of shallow groundwater for drinking water, thus eliminating the risk of future residents being exposed to groundwater with chloroform concentrations above 80 µg/L.

9. SPECIFIC CONSIDERATIONS IN DETERMINING CORRECTIVE ACTION IS COMPLETE

In reviewing the total administrative record in this matter, DTSC has evaluated a number of specific issues in reaching its conclusion that the overall Corrective Action Objective for the Chloroform Release Area (to prevent exposure of future on-site populations to elevated concentrations of chloroform in soil, soil gas, and groundwater) has been met, and that corrective action is therefore complete at the Chloroform Release Area. This section summarizes DTSC's conclusions with respect to some of the major issues raised in the Administrative Record.

- There is no significant "continuing source" of chloroform at the site. Additional soil investigations in April/May 2008, which included extensive soil sampling from 14 soil borings that were installed within the approximately 4,000-square feet where the highest chloroform levels had previously been detected, confirm no significant mass of chloroform remains at the Chloroform Release Area. Of the small amount of chloroform that does remain, most of it is in the A/B Aquitard, below the A-aquifer, and that amount will continue to decline over time with natural flushing. Because the A/B Aquitard is below the overlying water table throughout the year, chloroform in the A/B Aquitard cannot serve as a source for chloroform in soil gas migrating into shallower vadose zone soils. There is also a smaller residue of chloroform in the overlying A-aquifer, as well as a very small residue in the vadose zone. As discussed below, these residual amounts of chloroform in the A-aquifer and vadose zone soils are far too low to cause levels to exceed RBTCs.

The fact that the influent vapor concentrations entering the remedial system during the last eight months of operation of the system showed roughly the same very small amount of chloroform continuing to be removed each month, does not indicate a continuing source. That small amount of removal was sustained only as a result of continual adjustments and enhancements to the remedial system, such as the addition of a new extraction well in April 2008 and two additional ones in May 2008. In the final post-remediation sampling round in December, the concentration of chloroform in the three wells that had the highest chloroform concentrations in the first round in August (EW-5, EW-10, and EW-16), declined by 35 to 60 percent. These reductions reflect that there is not a significant "continuing source" of chloroform in the vadose zone or aquifer.

- The groundwater and soil gas levels of chloroform are not expected to "rebound" to levels near the RBTCs. Three rounds of post-remediation sampling were conducted, as described above. To further confirm attainment of the CAOs, the final round in December increased the density of the sampling grid by taking soil gas samples at two new locations in the areas that had shown the highest concentrations in the previous rounds, and also included taking soil gas samples at two new depths, 15 feet and 23-25 feet. These three post-remediation sampling rounds indicate that soil gas RBTCs in the Chloroform Release Area have been achieved.

All of the groundwater data from the A-aquifer are well below RBTCs. As the water level increases from seasonal recharge in the Fall, chloroform concentrations in the A-aquifer on average have declined (consistent with a process of periodic, seasonal flushing) and remain well below the RBTCs for groundwater. Chloroform concentrations in the A-aquifer are not expected to rebound to a degree that would cause them to approach, much less exceed, the RBTC of 380 µg/L in the future.

The measured chloroform concentrations in soil gas during the post-remediation sampling rounds are well below RBTCs, and exhibit no demonstrable trends toward increasing concentrations. Given this fact and the absence of any evidence of a zone of higher chloroform concentrations in the vadose zone that could serve as a future soil gas source, it is not expected that soil gas concentrations would exceed the RBTCs in the future.

- The site-specific RBTCs were developed and modified in accordance with acceptable risk assessment practices. In January 2005, Hitachi GST's consultant ENVIRON submitted to DTSC the "Screening Groundwater/Soil Human Health Risk Assessment" (2005 Screening HRA). In that document, ENVIRON developed RBTCs based largely on conservative default parameters because it had not yet conducted significant subsurface investigations of the Redevelopment Property. The RBTC for chloroform in groundwater in the 2005 Screening HRA was 52 µg/L. After the extensive site investigations conducted between late 2004 and mid-2007, ENVIRON recalculated RBTCs using site-specific parameters rather than default values for the parameters considered in calculating RBTCs. This resulted in changes to a number of the RBTCs included in the 2007 Final Remedy Completion Report for the Redevelopment Area. Through approving that document in November 2007, DTSC approved the revised, site-specific RBTCs, which included the 380 µg/L RBTC for chloroform in A-aquifer groundwater. DTSC likewise approved the 380 µg/L RBTC through its simultaneous approval of the Chloroform CMS Report in November 2007.
- DTSC is confident that the soil gas and groundwater sampling results accurately reflect the subsurface conditions.
 - Attainment of the CAOs is determined by measurements of actual subsurface conditions, not by calculations derived from the mass removed by the system. It is the longstanding practice of DTSC and other regulatory agencies overseeing corrective actions and remedial activities to measure attainment of cleanup goals and CAOs by taking actual measurements of the levels of the constituent of concern in the media of concern, i.e., in soil, soil gas and/or groundwater. As indicated above, such actual measurements in the Chloroform Release Area confirm that the RBTCs for chloroform have been sustainably achieved. By contrast, measurements of chloroform removed by the extraction system are not accurate indicators of the amount remaining in the aquifer, because it is impossible to determine how much of the chloroform removed by the system came from the A-aquifer and how much came from other subsurface areas.
 - Reliable leak prevention and detection methods were used, and the soil gas results were not adversely affected by dilution from ambient air. Hitachi GST's contractor ENVIRON used an approved soil gas sampling method using Geoprobe-PRT temporary probes for all of its soil gas sampling through the October 2008 sampling event. Temporary probes were used for monitoring conducted during system operation in lieu of semi-permanent implants or permanent vapor wells because such implants or vapor wells represent potential failure points which can reduce the effectiveness of the extraction system. Standard leak detection procedures, including the use of the leak detection compound 1,1-difluoroethane (1,1-DFA), were used during all soil gas sampling activities. The leak detection compound was only very rarely detected, confirming the integrity of the soil gas results.

To further confirm the integrity of the soil gas sampling results, Hitachi GST, in consultation with DTSC, used semi-permanent soil gas probes in its final post-remediation sampling round in December 2008. Senior DTSC staff were on-site observing the installation of these probes and the sample collection process. The leak detection compound was not detected at levels above the standard DTSC-prescribed reporting limit for 1,1-DFA of 10 µg/L. There were some detections of the compound at very low levels, all less than half the standard reporting limit, and most more than an order of magnitude less. DTSC is satisfied that the validity of the soil gas sampling results is not impaired by intrusion of ambient air into the samples.

The detections in the soil gas samples of benzene, toluene, ethylene and xylene (collectively known as BTEX, and commonly found in ambient air as a result of automobile emissions) in the soil gas sampling results does not affect DTSC's confidence in the integrity of the soil gas sampling results. The presence of BTEX (at levels that are detectable but below regulatory concern) in over 90 percent of the samples clearly suggests that it was introduced into the subsurface by the extraction system itself, not by leaks in sampling probes.

- DTSC is confident there is no need to consider an alternative remedial approach, and therefore no need for a separate CEQA review. The Negative Declaration prepared by DTSC pursuant to the California Environmental Quality Act (CEQA) to support its November 2007 remedy selection decision for the Chloroform Release Area states, on page 3, "If the cleanup goals cannot be met by continued operation of the 2-PHASE™ Extraction System, then an alternative approach will be considered and potential environmental impacts will be evaluated in a separate CEQA document." For the reasons described in this Statement of Basis, DTSC has determined that it was not necessary to consider an alternative approach because the overall CAO for the remedy has been met, as have the media-specific CAOs for soil, soil gas and groundwater. As a result, there is no alternative to evaluate in a separate CEQA document. DTSC has prepared an Addendum to the Negative Declaration explaining the minor variations between the project as set forth in the Chloroform CMS Report and Negative Declaration and the project as implemented.

10. PUBLIC PARTICIPATION

Remedy Selection

DTSC held a 45-day public comment period from August 31, 2007, through October 15, 2007, to seek public comments on the draft modified permit and proposed corrective actions for the Redevelopment Property. A public notice regarding the public comment period and public hearing was published in the San Jose Mercury News on August 31, 2007. The notice was broadcast three times on radio station KBAY (FM 94.5) on August 31, 2007. A fact sheet regarding the proposed remedy was mailed to approximately 6,900 persons, organizations, and addresses on the facility mailing list. A public hearing was held, starting at 6:30 PM on Tuesday, October 9, 2007, at the Southside Community Center in San Jose. Seven members of the public attended the public hearing but no comments were received. No written or verbal comments were received during the public comment period.

Corrective Action Complete Determination

DTSC held a 30-day public comment period from January 14, 2009, through February 13, 2009, to seek public comments on its proposed decision that corrective action is complete for the 0.78 acre Chloroform Release Area. A display advertisement was placed in the San Jose Mercury News published on January 14, 2009, announcing the public comment period and the public hearing on January 29, 2009. A radio announcement was broadcast four (4) times on January 14, 2009, on radio station KEZR (FM 106.5). A fact sheet with information about the project and public participation activities was mailed on January 9, 2009, to approximately 6,900 addresses on the facility mailing list. A public hearing was held on January 29, 2009, at the Southside Community Center, 5585 Cottle Road, San Jose. The public hearing was attended by approximately 23 people (not counting DTSC staff) including eight (8) members of the general public and a representative for PCCP Signature San Jose, LLC, the prospective purchaser of the Hitachi GST Redevelopment Property. Mr. Stuart Block, the representative for PCCP Signature San Jose, LLC, provided a verbal statement at the public hearing. Written comments concerning the proposed corrective action complete determination for the Chloroform Release Area were received from Mr. Jason Jegge, San Jose resident, and from Mr. Michael Ghielmetti, President of Administrative Member, PCCP-Signature San Jose, LLC. DTSC prepared a Response to Comments, dated March 16, 2009.

11. NEXT STEPS

DTSC considered all public comments received and has issued the Corrective Action Complete Determination for the Chloroform Release Area on March 16, 2009. The Corrective Action Complete Determination is effective on the date it is issued. DTSC has also prepared a Notice of Decision and a CEQA Notice of Determination for the Corrective Action Complete Determination. The Corrective Action Complete Determination letter, Response to Comments, Notice of Decision, Notice of Determination, and this updated Final Statement of Basis will be placed with the Administrative Record in the project information repositories listed below and will also be placed on DTSC's website at www.dtsc.ca.gov.

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